

3. (NEW) A method for linking code downloaded to a computer, the computer comprising a first package that includes a mapping of tokens to externally referenceable items, the method comprising:
- receiving a second package comprising at least one reference to an item in said first package,
- wherein said reference is represented by one or more tokens; and
- linking said second package to said first package by resolving said one or more tokens.
4. (NEW) A method for constructing an image of a first package of code on a computer, the code being separable into at least one package having at least one reference to an item in a second package of code, the method comprising:
- receiving a mapping of said item to at least one corresponding token;
- replacing said at least one reference with said at least one corresponding token; and
- forming said package.
5. (NEW) A method for constructing an image of a first package of code comprising at least one internally referenceable item, the method comprising:
- forming a mapping of said at least one internally referenceable item to an optimized numeric value;
- replacing references to said at least one internally referenceable item with the corresponding numeric value; and
- forming the package.

Docket No. SUN-P3730

6. (NEW) The method of claim 1 wherein said mapping further comprises generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.
7. (NEW) The method of claim 1, further comprising recording in an image of said package a mapping between said token and said referenceable item.
8. (NEW) The method of claim 1 wherein said referenceable item comprises a class and said reference comprises a package and a class token.
9. (NEW) The method of claim 1 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.
10. (NEW) The method of claim 1 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.
11. (NEW) The method of claim 3 wherein said mapping further comprises generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.
12. (NEW) The method of claim 3, further comprising recording in an image of said package a mapping between said token and said referenceable item.

13. (NEW) The method of claim 3 wherein said referenceable item comprises a class and said reference comprises a package and a class token.
14. (NEW) The method of claim 3 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.
15. (NEW) The method of claim 3 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.
16. (NEW) The method of claim 1 wherein
said package further comprises interfaces and interface method definitions; and
said method further comprises constructing at least one interface method table for a class.
17. (NEW) The method of claim 16 wherein said constructing comprises:
obtaining said interfaces;
constructing an ordered table of methods for each interface; and
recording an indication of the implementation of the interface method for each table entry.
18. (NEW) The method of claim 17 wherein said ordered interface method table entries
correspond to token values assigned to interface methods within the scope of said class.
19. (NEW) The method of claim 18 wherein said indication of said implementation of said
interface method comprises an index into a virtual method table.
20. (NEW) The method of claim 3, further comprising resolving interface method references
during execution using interface method tables, said resolving comprising:
obtaining an associated instance;

APB
obtaining a class description of said instance;

locating an interface table of said interface method in said class description;

locating an interface method entry within an interface table of a referenced method; and

locating the implementation of said interface method based on the table entry content.

- Q*
21. (NEW) The method of claim 20 wherein an indication of said implementation of said interface method comprises an index into a virtual method table.
22. (NEW) The method of claim 5 wherein said package further comprises at least one reference to an internal item.
23. (NEW) The method of claim 22 wherein said internal item comprises a class and said reference comprises an offset within said package to a class record associated with said class.
24. (NEW) The method of claim 22 wherein said internal item comprises a static field and said reference comprises an offset within said package to a value for said static field.
25. (NEW) The method of claim 22 wherein said internal item comprises a static method and said reference comprises an offset within said package to code associated with said static method.
26. (NEW) The method of claim 22 wherein said internal item comprises an instance field and said reference comprises an offset within said package to a class record of said instance field and a field token.



- Sub
P1
27. (NEW) The method of claim 22 wherein said internal item comprises a virtual method and said reference comprises an offset within said package to a class record of said virtual method and a method token.
28. (NEW) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for downloading code to a resource-constrained computer, the code being separable into at least one package having at least one referenceable item, the method comprising:
- forming the package;
 - forming a mapping of the referenceable item to a corresponding token; and
 - providing the package and the mapping.
29. (NEW) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for linking code downloaded to a resource-constrained computer, the code being separable into at least one package having at least one referenceable item, the method comprising:
- receiving the package;
 - receiving a mapping of the referenceable item to a corresponding token; and
 - linking the package using the mapping.

- Hub
B2
30. (NEW) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for linking code downloaded to a computer, the computer comprising a first package that includes a mapping of tokens to externally referenceable items, the method comprising:
- receiving a second package comprising at least one reference to an item in said first package,
- wherein said reference is represented by one or more tokens; and
- linking said second package to said first package by resolving said one or more tokens.
31. (NEW) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for constructing an image of a first package of code on a computer, the code being separable into at least one package having at least one reference to an item in a second package of code, the method comprising:
- receiving a mapping of said item to at least one corresponding token;
- replacing said at least one reference with said at least one corresponding token; and
- forming said package.
32. (NEW) A program storage device for constructing an image of a first package of code comprising at least one internally referenceable item, the method comprising:
- forming a mapping of said at least one internally referenceable item to an optimized numeric value;
- replacing references to said at least one internally referenceable item with the corresponding numeric value; and
- forming the package.

33. (NEW) The program storage device of claim 28 wherein said mapping further comprises generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.
34. (NEW) The program storage device of claim 28 wherein said method further comprises recording in an image of said package a mapping between said token and said referenceable item.
35. (NEW) The program storage device of claim 28 wherein said referenceable item comprises a class and said reference comprises a package and a class token.
36. (NEW) The program storage device of claim 28 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.
37. (NEW) The program storage device of claim 28 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.
38. (NEW) The program storage device of claim 30 wherein said mapping further comprises generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.

- Sub
P4
39. (NEW) The program storage device of claim 30 wherein said method further comprises recording in an image of said package a mapping between said token and said referenceable item.
40. (NEW) The program storage device of claim 30 wherein said referenceable item comprises a class and said reference comprises a package and a class token.
41. (NEW) The program storage device of claim 30 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.
42. (NEW) The program storage device of claim 30 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.
43. (NEW) The program storage device of claim 28 wherein said package further comprises interfaces and interface method definitions; and said method further comprises constructing at least one interface method table for a class.
44. (NEW) The program storage device of claim 43 wherein said constructing comprises: obtaining said interfaces; constructing an ordered table of methods for each interface; and recording an indication of the implementation of the interface method for each table entry.
45. (NEW) The program storage device of claim 44 wherein said ordered interface method table entries correspond to token values assigned to interface methods within the scope of said class.

46. (NEW) The program storage device of claim 45 wherein said indication of said implementation of said interface method comprises an index into a virtual method table.
47. (NEW) The program storage device of claim 30 wherein said method further comprises resolving interface method references during execution using interface method tables, said resolving comprising:
- obtaining an associated instance;
 - obtaining a class description of said instance;
 - locating an interface table of said interface method in said class description;
 - locating an interface method entry within an interface table of a referenced method; and
 - locating the implementation of said interface method based on the table entry content.
48. (NEW) The program storage device of claim 47 wherein an indication of said implementation of said interface method comprises an index into a virtual method table.
49. (NEW) The program storage device of claim 32 wherein said package further comprises at least one reference to an internal item.
50. (NEW) The program storage device of claim 49 wherein said internal item comprises a class and said reference comprises an offset within said package to a class record associated with said class.
51. (NEW) The program storage device of claim 49 wherein said internal item comprises a static field and said reference comprises an offset within said package to a value for said static field.

- 
- 
52. (NEW) The program storage device of claim 49 wherein said internal item comprises a static method and said reference comprises an offset within said package to code associated with said static method.
53. (NEW) The program storage device of claim 49 wherein said internal item comprises an instance field and said reference comprises an offset within said package to a class record of said instance field and a field token.
54. (NEW) The program storage device of claim 49 wherein said internal item comprises a virtual method and said reference comprises an offset within said package to a class record of said virtual method and a method token.
55. (NEW) An apparatus for downloading code to a resource-constrained computer, the code being separable into at least one package having at least one referenceable item, the apparatus comprising:
- means for forming the package;
 - means for forming a mapping of the referenceable item to a corresponding token; and
 - means for providing the package and the mapping.
56. (NEW) An apparatus for linking code downloaded to a resource-constrained computer, the code being separable into at least one package having at least one referenceable item, the apparatus comprising:
- means for receiving the package;
 - means for receiving a mapping of the referenceable item to a corresponding token; and
 - means for linking the package using the mapping.

57. (NEW) An apparatus for linking code downloaded to a computer, the computer comprising a first package that includes a mapping of tokens to externally referenceable items, the apparatus comprising:
- means for receiving a second package comprising at least one reference to an item in said first package, wherein said reference is represented by one or more tokens; and
- means for linking said second package to said first package by resolving said one or more tokens.
58. (NEW) An apparatus for constructing an image of a first package of code on a computer, the code being separable into at least one package having at least one reference to an item in a second package of code, the apparatus comprising:
- means for receiving a mapping of said item to at least one corresponding token;
- means for replacing said at least one reference with said at least one corresponding token; and
- means for forming said package.
59. (NEW) An apparatus for constructing an image of a first package of code comprising at least one internally referenceable item, the apparatus comprising:
- means for forming a mapping of said at least one internally referenceable item to an optimized numeric value;
- means for replacing references to said at least one internally referenceable item with the corresponding numeric value; and
- means for forming the package.

60. (NEW) The apparatus of claim 55 wherein said mapping further comprises generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.

61. (NEW) The apparatus of claim 55, further means for comprising recording in an image of said package a mapping between said token and said referenceable item.

62. (NEW) The apparatus of claim 55 wherein said referenceable item comprises a class and said reference comprises a package and a class token.

63. (NEW) The apparatus of claim 55 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.

64. (NEW) The apparatus of claim 55 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.


65. (NEW) The apparatus of claim 57 wherein said means for mapping further comprises means for generating one or more token types, such that tokens belonging to the same token type represent the same kind of referenceable item.

66. (NEW) The apparatus of claim 57, further comprising means for recording in an image of said package a mapping between said token and said referenceable item.

67. (NEW) The apparatus of claim 57 wherein said referenceable item comprises a class and said reference comprises a package and a class token.
68. (NEW) The apparatus of claim 57 wherein said referenceable item comprises a field and said reference comprises a package, a class and a field token.
69. (NEW) The apparatus of claim 57 wherein said referenceable item comprises a method and said reference comprises a package, a class and a method token.
70. (NEW) The apparatus of claim 55 wherein said package further comprises interfaces and interface method definitions; and said apparatus further comprises means for constructing at least one interface method table for a class.
71. (NEW) The apparatus of claim 70 wherein said constructing comprises:
means for obtaining said interfaces;
means for constructing an ordered table of methods for each interface; and
means for recording an indication of the implementation of the interface method for each table entry.
72. (NEW) The apparatus of claim 71 wherein said ordered interface method table entries correspond to token values assigned to interface methods within the scope of said class.
73. (NEW) The apparatus of claim 72 wherein said indication of said implementation of said interface method comprises an index into a virtual method table.

74. (NEW) The apparatus of claim 57, further comprises means for resolving interface method references during execution using interface method tables, said means for resolving comprising:
- means for obtaining an associated instance;
 - means for obtaining a class description of said instance;
 - means for locating an interface table of said interface method in said class description;
 - means for locating an interface method entry within an interface table of a referenced method; and
 - means for locating the implementation of said interface method based on the table entry content.
75. (NEW) The apparatus of claim 74 wherein an indication of said implementation of said interface method comprises an index into a virtual method table.
76. (NEW) The apparatus of claim 59 wherein said package further comprises at least one reference to an internal item.
77. (NEW) The apparatus of claim 76 wherein said internal item comprises a class and said reference comprises an offset within said package to a class record associated with said class.
78. (NEW) The apparatus of claim 76 wherein said internal item comprises a static field and said reference comprises an offset within said package to a value for said static field.
79. (NEW) The apparatus of claim 76 wherein said internal item comprises a static method and said reference comprises an offset within said package to code associated with said static method.

Docket No. SUN-P3730

- 
80. (NEW) The apparatus of claim 76 wherein said internal item comprises an instance field and said reference comprises an offset within said package to a class record of said instance field and a field token.
81. (NEW) The apparatus of claim 76 wherein said internal item comprises a virtual method and said reference comprises an offset within said package to a class record of said virtual method and a method token.
-